From:	scott.glum@epa.ohio.gov
To:	Patterson, Leslie
Cc:	Adler, Kevin
Subject:	Pristine, Inc. Site, MNA Interim Report - Ohio EPA Comments
Date:	Friday, October 30, 2015 2:22:35 PM
Attachments:	Pristine MNA Interim Report_Ohio EPA comments.pdf

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Hi Leslie. Ohio EPA's comments are attached. We can talk when you get back. I hope all is going well.

-Scott

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Ohio Environmental Protection Agency

John R. Kasich, Governor
Mary Taylor, Lt. Governor
Craig W. Butler, Director

October 30, 2015

Leslie Patterson
Remedial Project Manager
U.S. EPA, Region V
77 West Jackson Blvd (SR-6J)
Chicago, IL 60604-3590

Re: Pristine Inc, Reading
Remediation Response
Project records
Remedial Response
Hamilton County
531000648001

Subject: Ohio EPA Report Review
Monitored Natural Attenuation Pilot Program Data Evaluation
Interim Report, June 2015

Dear Ms. Patterson:

On June 16, 2015, the Ohio Environmental Protection Agency (EPA) Division of Environmental Response and Revitalization received the Monitored Natural Attenuation (MNA) Pilot Program Data Evaluation Interim Report submitted by Conestoga-Rovers & Associates, on behalf of the Pristine Trust. Ohio EPA Division of Drinking and Ground Waters is providing the following comments to assist in the completion of an approvable document.

1. Section 1.0, Introduction: Rather than demonstrating "occurrence of biodegradation processes in groundwater beneath and downgradient from the Site" (Sections 1.1, 6.1, and 7.3), Ohio EPA recommends the objective of interim reporting be changed similar to that recommended by U.S. EPA MNA guidance, to demonstrate whether biodegradation will "achieve site-specific remedial objectives within a time frame that is reasonable compared to that offered by other more active methods" (Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water, U.S. EPA, September, 1998). In order to meet the objective of demonstrating attainment in a time frame that is reasonable, reports should compare performance metrics to established goals on an annual basis.

2. Section 2.0, Site Background: As a first step in measuring biodegradation performance, the section should be modified to identify the point of compliance for ground water cleanup standard attainment.

3. Section 3.2, VOC Distribution Overview: In order to assist evaluation of biodegradation performance, Ohio EPA recommends reports begin annually

providing chemical specific plume delineation concentration maps for the predominant constituents of concern. These maps should highlight the plume area in excess of respective ground water cleanup standards.

4. Section 3.2, VOC Distribution Overview: In order to improve map clarity and reporting, map figures 3.1 through 3.4 should be modified to provide a scale bar with a referenced distance. While bars are depicted in the reported map legends, no distance values are assigned for scale.

5. Section 4.2, Biodegradation: While the section describes biodegradation processes in general, Ohio EPA recommends that areas where these processes are thought to occur be demonstrated.

6. Section 6.0, MNA Evaluation: The report should provide estimated times for attaining ground water cleanup standards, through estimation of constituent specific biodegradation rates. One method for estimating biodegradation rates uses concentration results from monitoring wells located along the longitudinal plume axis (see page 18, Methodology for Estimating Times of Remediation Associated with Monitored Natural Attenuation; Water Resources Investigation Report 03-4057; U.S. Geological Survey; 2003). Once estimated, the biodegradation rate can be input into a first order decay equation to estimate time. Software such as Biochlor and Natural Attenuation Software are also available to estimate time.

7. Section 6.0, MNA Evaluation: The concentration and trend for the primary COCs at each well should annually be compared to respective ground water cleanup values.

8. Section 6.0, MNA Evaluation: Reports should annually compare the ratio of parent COCs to daughter products at each well, to demonstrate the degree of degradation progress.

9. Section 6.0, MNA Evaluation: Page 18 states that the primary indication of 1,2-DCA degradation “under reducing conditions” is the presence of ethene. If reductive dechlorination of 1,2-DCA is proposed as the dominant degradation mechanism, then the section should demonstrate where the process is thought to occur, through a comparison of REDOX indicator values to threshold concentrations indicative of necessary reducing conditions.

10. Section 6.0, MNA Evaluation: Page 19 states that 1,2-DCA can also breakdown under aerobic conditions. If off-site aerobic oxidation of 1,2-DCA is thought to occur, then the section should demonstrate where, through a comparison of REDOX indicator values to necessary threshold concentrations.

11. Section 6.2.1, VOC Distribution: In order to demonstrate efficient concentration declines through biodegradation, Ohio EPA recommends reports annually compare percentage change in average plume area and change in center of

mass, for the predominant COCs. Comparison should be made to the previous year and the initial baseline year, presumably year 2012. The ground water cleanup standard is recommended as the outer contour for computing plume area and center of mass. A decline in plume area and a northerly shift in plume center of mass would indicate plume contraction. However, an expansion of plume area and a southerly shift in center of mass with the direction of ground water flow would indicate plume expansion, and the potential need for remedy modification. An insignificant change would indicate plume stability.

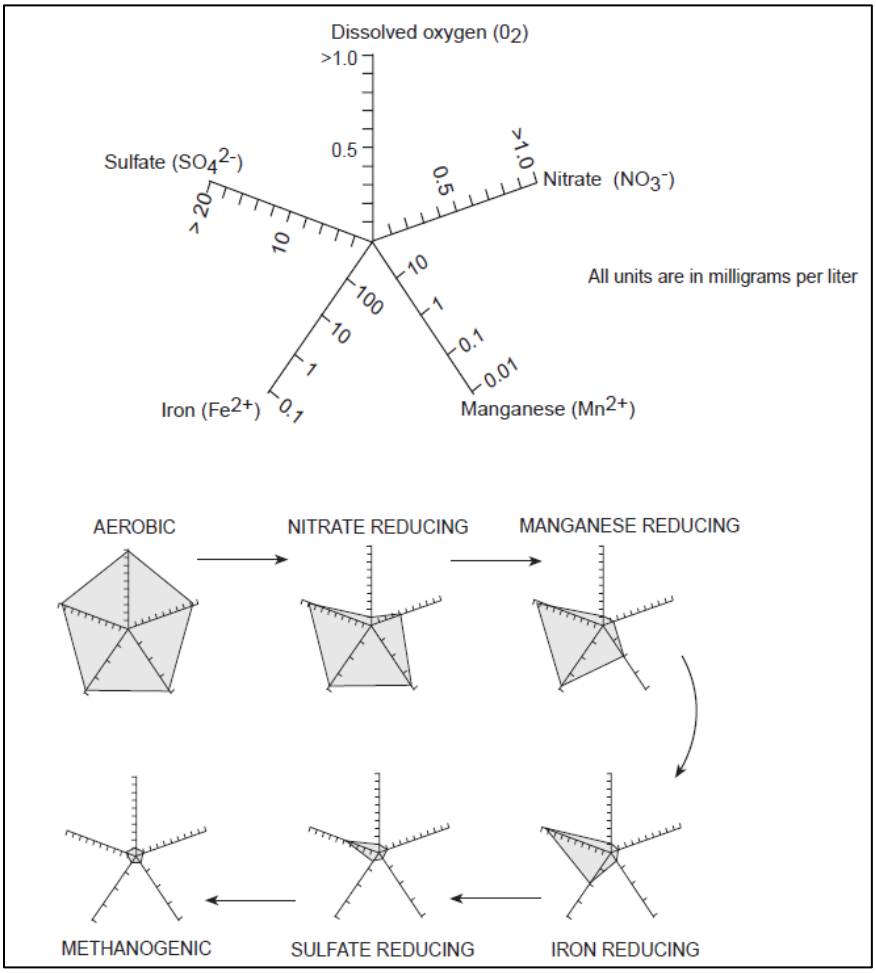
12. Section 6.3, Groundwater Redox Conditions: In order to improve demonstration of reductive dechlorination effectiveness, Ohio EPA recommends reports begin discussing progress toward the plume transitioning from being 1,2-DCA dominated, to being terminal breakdown product and innocuous by-product dominated.

13. Section 6.3, Groundwater Redox Conditions: In areas where efficient reductive dechlorination of TCE is proposed, reports should demonstrate that sulfate reducing to methanogenic conditions necessary for efficient reductive dechlorination are present. Sulfate and methane concentrations should be compared to threshold performance concentrations. In selecting threshold concentrations, Ohio EPA recommends reference to U.S. EPA's Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water, EPA/600/R-98/128, September 1998. According to U.S. EPA protocol, sulfate concentrations indicative of sulfate reducing conditions are typically less than 20 mg/L. According to the U.S. Geological Survey, Water Resources Investigation Report 03-4057, methane concentrations indicative of methanogenesis are typically in excess of 0.2 mg/L.

14. Section 6.3.2, Radial Diagram Evaluation: While the page 32 discussion states that the REDOX radial diagrams for years 2012, 2013, and 2014 (Figure 6.1, 6.2, and 6.3 respectively) "provide good evidence that reductive biodegradation is possible at the Site and within the Plume area", Ohio EPA notes that in most cases the diagrams do not indicate the presence of highly anaerobic sulfate reducing to methanogenic conditions necessary for efficient reductive dechlorination of TCE. While Ohio EPA agrees that the radial diagram polygons are smaller than the outline corresponding to theoretical oxidizing conditions, it should be noted that a lack of aerobic oxidizing conditions does not provide evidence of efficient reductive dechlorination. The report should specify which constituents and which areas are intended for reductive dechlorination. Section 4.2 seems to suggest that oxidation of 1,2-DCA might also be occurring, presumably offsite. However, it should be recognized that conditions conducive to 1,2-DCA oxidation would diminish the efficiency of reductive dechlorination.

15. Section 6.3.2, Radial Diagram Evaluation: The Ohio EPA recommends that the sulfate axes on the radial diagrams be reversed in accordance with standard convention, so that concentration decreases less than the sulfate reducing threshold of 20 mg/L result in smaller rather than larger polygons. According to

Carey et al, “the background concentrations for REDOX indicators should appear outermost on each axis, and the concentrations representing a zone where biodegradation is occurring appear toward the inner extent of each axis, i.e. closer to the origin” (Ground Water Monitoring & Remediation, Vol. 23, no. 4, Fall 2003, pages 75-84). The enclosed REDOX radial diagrams illustrate that under sulfate reducing conditions, sulfate concentrations should decrease from background toward the center, rather than increase outward as presented in report Figures 6.1, 6.2, and 6.3. As presented in the report, potential sulfate reducing conditions at locations such as well MW-70 are not readily discernible.



Radial diagrams used to illustrate electron acceptor processes (modified from Carey, 1988); Biodegradation of Chlorinated Ethenes at a Karst Site in Middle Tennessee; Water-Resources Investigation Report 99-4285; U.S. Geological Survey

16. Section 6.3.2, Radial Diagram Evaluation: Clarification is requested as to whether methane concentrations shown in the radial diagrams for upgradient wells MW71, MW72, and MW73, and on site wells MW69 and MW70 exceed 0.2 mg/L. If this is the case, highly anaerobic methanogenic conditions conducive to reductive dechlorination would appear to be present at the downgradient Site perimeter, and immediately upgradient of the Site.

17. Section 6.3.2, Radial Diagram Evaluation: Clarification is requested as to why REDOX sensitive parameters are not reported for on-site wells MW80, MW81, and neighboring downgradient wells MW77, MW78, MW79.

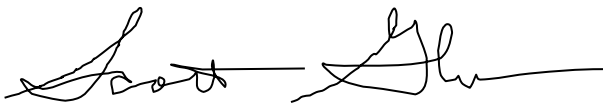
18. Section 6.4, Presence of Degradation Products: Discussion is requested for the 1,2-DCA trend at downgradient well MW-95, with a most recent April 2015 concentration of 150 ug/L, in excess of the cleanup standard of 5 ug/L. Discussion is requested for the 1,2-DCA increasing trend at on-site well MW-68, with a most recent August 2014 concentration of 410 ug/L, in excess of the cleanup standard of 5 ug/L. Discussion is also requested for the 1,2-DCA increasing trend at on-site extraction well EW-1, with a most recent August 2014 concentration of 650 ug/L, in excess of the cleanup standard of 5 ug/L.

19. Section 6.4, Presence of Degradation Products: In regards to the section's closing statement that "the presence of degradation products in the study area is strong evidence that reductive biodegradation is occurring at the Site," the discussion should address what processes are occurring for which constituents, identify process location areas, and discuss metrics to demonstrate whether the processes are proceeding in a timely manner.

20. Section 6.4, Presence of Degradation Products: Because TCE degradation is proposed to originate upgradient rather than on-site, Ohio EPA recommends consideration be given to providing a demonstration, through a comparison of molar ratios of parent to daughter compounds. Such comparison could serve to demonstrate whether observed vinyl chloride and ethene is primarily attributable to TCE reductive dechlorination, rather than 1,2–DCA degradation. Monitoring well specific pie charts comparing the molar concentrations as percentages could be a useful means of correlating wells affected primarily by TCE reductive dechlorination.

If you have any questions, please contact me at (937) 285-6065 or scott.glum@epa.ohio.gov.

Sincerely,



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